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H. L. Richardson, project manager of the FFHC Fertilizer Programme, plans and directs the Programme as well as travelling to and speaking in the countries concerned. A New Zealander, Dr. Richardson studied at Wellington and London Universities. He has written a book and numerous papers, and he contributes to technical journals on agriculture, soils and fertilizer use. He joined FAO in 1961 after 15 years in ICI, the last four as manager, Overseas Agricultural Department, of what is now Agricultural Division.

Norman Crowder is in Mond Division's Technical Service Department and looks after a wide variety of products, including trichloroethylene for paints, and solvents for dry cleaning. After studying chemistry and textiles at Manchester College of Technology he spent several years as a research chemist in the textile industry before joining ICI in 1947. He helped to develop the ICI solvent-scouring process for textiles.

Gordon Begg runs Millbank Films Ltd., where work is now in progress for seven ICI Divisions as well as for outside companies. He joined the ICI Film Unit in 1947. Since then he has written and directed over 60 films.

FRONT COVER
The brilliant green expanse of sea in the foreground indicates the spreading presence of fluorescein, a dye used to trace tidal currents. Men in the boat are staff of ICI's Brixham Research Laboratory. This laboratory, set up in 1948 by Paints Division to study the fouling of ships' bottoms by barnacles, concentrates today on problems of treatment and disposal of chemical and other manufacturing wastes and effluents.

COVER PHOTOGRAPHS
Front: Ronald Chapman. Back: Michael Taylor

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Trevor Williams

THE MAN WHO 'WEIGHED' ATOMS

112 **Manchester in Dalton's day**

Two hundred years ago, on 5th September, John Dalton was born—the man who in 1803 put forward an atomic theory that has influenced scientific thought for more than a century-and-a-half. Anniversary celebrations are to be held in London and in Manchester, where Dalton made his home for many years. While scientists generally owe much to Dalton, chemists —and hence the chemical industry—are particularly indebted to him. This thought was certainly in the minds of those who founded ICI: Dalton's name is engraved—along with those of other great chemists, among them Lavoisier, Priestley, and Liebig—high up on IC House at Millbank. As part of the celebrations, which are being organised jointly by the Royal Society, the Chemical Society, the Royal Institute of Chemistry, the Society of Chemical Industry and the Manchester Literary and Philosophical Society, ICI will give the first public showing of a film on Dalton, which will then be available for use in schools and universities along with our other educational films.

Even in Dalton's day atomic theories were not novel. Classical philosophers, such as Lucretius, had speculated whether matter was continuous or whether there was a limit beyond which it could no longer be divided. Nicholas Hill and Robert Boyle, founder-members of the Royal Society, and Newton were among the many who had also speculated about atoms. Why, then, is it Dalton whose work is so particularly honoured rather than that of his great predecessors? The answer lies, at least in part, in the fact that Dalton's theory was practical and useful, whereas those of his predecessors had

List of Elements (1806–7): lecture diagram drawn by John Dalton. (*Crown copyright* Science Museum, London)

Dalton prepared these coloured threads of silk for tests he carried out about 1830. (*Crown copyright* Science Museum, London)

been essentially philosophical and abstract. By the end of the eighteenth century chemical experiments had become quantitative as well as qualitative, and the use of the balance was firmly established in the laboratory. A theory was needed that would explain not only why reactions occur but why there is a definite relationship between the weights of reactants and products and why compounds are of constant composition. The conception that atoms of any given element are all alike, indivisible, and of the same weight, and that atoms combine in relatively simple ways, explained many then recent discoveries and opened up new fields for experiment, as Berzelius (the great Swedish scientist) and others were quick to realise. Dalton's theory was not only fundamentally right—it has stood the test of the years remarkably well, even though we now know that the story is a great deal more complex than he realised—but it was timely.

John Dalton rose from humble origins. Born at Eaglesfield in Cumberland in 1766, he was the third of six children of a handloom weaver. Brought up in the Quaker faith, he was fortunate in having as his schoolmaster another remarkable Quaker: this was Elihu Robinson, an experienced meteorologist and instrument-maker, who aroused in Dalton his own interest in weather observation and scientific experiment. It was Dalton's interest in the weather—of which he kept a daily record from boyhood until his death—which led him eventually to study the properties of the atmosphere and of gaseous mixtures generally. This in turn led him to speculate why a mixture of a light and a dense gas does not settle into two separate layers instead of remaining uniformly mixed. Out of this grew—at least in part—his atomic theory. It is significant that Dalton's first reference to his theory came, quite casually, at the end of a paper on the absorption of gases by liquids, which he read in 1803. Apart from his atomic theory, we owe to Dalton two important laws concerning gases. These are the law of partial pressures, according to which the pressure of a mixed gas is the sum of the pressures of its components, and the law of thermal expansion of gases (commonly attributed to J. A. C. Charles), which states that the volume of a given mass of gas at constant pressure is directly proportional to the absolute temperature.

By the age of twelve Dalton had himself become a teacher at the local school, and three years later he joined his brother as teacher in a Quaker school at Kendal. Again he was lucky in his associates, for he came under the influence of the famous blind mathematician and botanist John Gough, whose own example encouraged him to keep his diary of weather observations. In 1793 he moved to Manchester, a city in which he lived for the rest of his life

and which acknowledges him as one of the most distinguished of its many famous citizens. There he was at first a tutor at the New College, a Presbyterian academy founded in 1786. But after a few years he left in order to give more time to his own scientific interests, and he made a living as best he could as a private tutor. In 1833 he was relieved of this necessity by the grant of a civil list pension of £150, increased to £300 three years later.

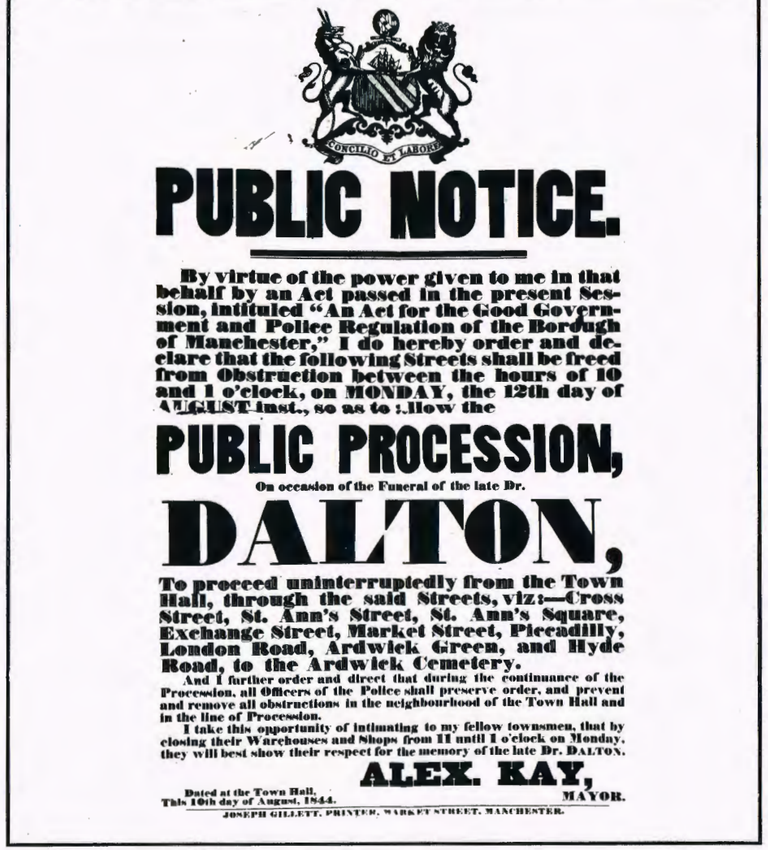
In Manchester, Dalton found himself in a lively and flourishing scientific community. The Manchester Literary and Philosophical Society had been founded in 1781; Dalton became a member in 1794 and during the next fifty years read more than a hundred papers to it. His connection with the Society was close and fruitful. In 1799 it purchased 36 George Street—unhappily almost completely destroyed, with its records, by an air raid in 1940—and here Dalton was given accommodation for teaching and research. A year later he became Secretary.

The favourable reception given to his first mention of his theory in 1803 led Dalton to develop it further. He described his ideas much more fully in lectures given at the Royal Institution in London in 1803–4 and later in a book, his *New System of Chemical Philosophy*, the first part of which appeared in 1808. Later, the Irish chemist William Higgins claimed priority over Dalton, maintaining that he had advanced a similar theory as early as 1789, but although he received a measure of support—from Sir Humphry Davy among others—it is generally agreed that it was Dalton who first clearly put forward the vital concept that the atom of every chemical element has a characteristic weight. Although we now know that the atom itself has a very complex structure and is far from being indivisible, there are many chemical problems—and quite a few physical ones—for whose understanding simple Daltonian atoms meet our needs.

Rather surprisingly, Dalton's atomic theory was his one really great achievement. His other chemical work, his meteorological studies, his study of the properties of gases, and his investigation of colour-blindness (of which he was himself a victim), were certainly important and interesting but not in themselves sufficient to ensure lasting fame in the history of science. Unlike many original thinkers, he was fortunate in enjoying widespread recognition in his own lifetime. Manchester recognized his merit by electing him President of its Literary and Philosophical Society in 1817, but his first national honour came not from this country but from abroad. In 1816 he was elected a Corresponding Member of the French Academy, which incidentally celebrates its tercentenary this year. He attended meetings of the Academy and visited the laboratories of the great French scientists. Later, on the death of Sir Humphry Davy, he was accorded the signal honour of becoming one of the Academy's eight Foreign Associates.

At home, the Royal Society elected him to Fellowship in 1822—for some reason he had declined to allow his name to be put forward in 1810—and four years later awarded him its first Royal Medal. In 1832 Oxford University awarded him the degree of D.C.L. The occasion was a meeting of the British Association, which Dalton had helped to found, and his companions as honorary graduands were Michael Faraday, Sir David Brewster and Robert Brown. Edinburgh also awarded him an honorary degree.

Although some Mancunians had hoped that Dalton would devote more of his attention to the practical problems of their rapidly-growing industries, all were immensely proud of their distinguished citizen. In his lifetime they subscribed for a statue by Chantrey, and at his death, on 27th July 1844, they accorded the simple Quaker a civic funeral with full Victorian panoply. Forty thousand people filed past his coffin in the Town Hall, and there were 100 carriages in the funeral procession.



PUBLIC NOTICE.

By virtue of the power given to me in that behalf by an Act passed in the present Session, intituled "An Act for the Good Government and Police Regulation of the Borough of Manchester," I do hereby order and declare that the following Streets shall be freed from Obstruction between the hours of 10 and 1 o'clock, on MONDAY, the 12th day of AUGUST inst., so as to allow the

PUBLIC PROCESSION,

On occasion of the Funeral of the late Dr.

DALTON,

To proceed uninterruptedly from the Town Hall, through the said Streets, viz:—Cross Street, St. Ann's Street, St. Ann's Square, Exchange Street, Market Street, Piccadilly, London Road, Ardwick Green, and Hyde Road, to the Ardwick Cemetery.

And I further order and direct that during the continuance of the Procession, all Officers of the Police shall preserve order, and prevent and remove all obstructions in the neighbourhood of the Town Hall and in the line of Procession.

I take this opportunity of intimating to my fellow townsmen, that by closing their Warehouses and Shops from 11 until 1 o'clock on Monday, they will best show their respect for the memory of the late Dr. DALTON.

ALEX. KAY,
MAYOR.

Dated at the Town Hall,
This 10th day of August, 1844.

JOSEPH GILLETT, PRINTER, MARKET STREET, MANCHESTER.

When John Dalton died, in July 1844, he was given a civic funeral by the citizens of Manchester, where he lived and worked for many years. Forty thousand people filed past his coffin, and a hundred carriages followed his funeral procession

OUT OF KINGSTON . . .

In 1935 ICI established an Agency Inspectorate Office in Kingston, Jamaica, later known as the Caribbean Liaison Office. Its job was to advise the manufacturing Divisions on the suitability of agents and to extend the agency network. The area extended from Guatemala in the north to Ecuador in the south and included all the many large and small islands in the Caribbean area.

The subsequent build-up of an efficient agency system brought about a change in the role of the office with more emphasis on liaison work, intelligence and public relations. More recently it became apparent that the servicing of the area could, with modern communications, be more efficiently and economically carried out direct from the UK. So in May this year the Liaison Office was finally closed.

Those who have travelled the territories out of Kingston during the last 32 years will recall the colourful market of Chichicastenango in Guatemala; the tranquil atmosphere of Hamilton, Bermuda; the startling beauty of the Cordilleras seen from Quito in Ecuador; the white beaches of Antigua and Ocho Rios and the steel bands of Trinidad. How different from travelling between Stockton-on-Tees and Slough!

Lake Atitlan, Guatemala
Top: Trinidad carnival
Far left: Market at Chichicastenango, Guatemala

A demonstration plot in Ghana

TOWARDS FREEDOM FROM HUNGER

H. L. Richardson

If there is a single agent which, even when used alone and independently of other good farming methods, holds out hope for filling the world's granaries, that agent is fertilizer.

This is the broad conclusion to be drawn after five years' experience of the fertilizer programme operated by the Food and Agriculture Organisation of the United Nations, a conclusion supported by the results of 15,800 demonstrations and 2,200 field trials during the first three years. The programme, financed by the world fertilizer industry under the FAO's Freedom from Hunger Campaign, has shown that yields can be greatly increased, while the average profit to the farmer has been 250 per cent on his investment in the most efficient fertilizers.

Furthermore, it has become clear that fertilizers can be used with success by small peasant farmers employing their traditional farming methods. All that is needed is good advice and instruction about what fertilizers to use and how to use them. The FAO believes that, once the farmers have convinced themselves of the value of fertilizers, they will be all the more willing to try other modern methods of farming: better varieties of seed, crop protection, improved cultivation, and mechanization. Small peasant farmers can increase their crop yield by an average of more than 50 per cent by using fertilizers alone, and there seem to be few limits to the possibilities when fertilizers are effectively combined with other improved farming methods.

The overall effect of the programme has been to show governments how to persuade the small farmer to use fertilizers, and how to organize fertilizer distribution and credit systems where these are lacking. As a result, fertilizer consumption has increased twice as fast on the average in countries taking part in the fertilizer programme as it has in other, comparable countries.

By the end of 1965 about 56,500 demonstrations and 9,000 simple trials, or a total of well over 65,000, had been laid out in farmers' fields, and the programme is now proceeding at the rate of 20,000 demonstrations and trials a year. Results have varied considerably from region to region, depending on a variety of factors, including climate, market price and farming standards.

The programme has so far been carried out in three regions: the Near East and North Africa, West Africa, and northern Latin America. Looking at results available for the first three years of demonstrations, the last region has yielded the most dramatic results, with the average response to the best fertilizer treatments, "weighted," or adjusted to give due importance to each of the items taken into account, being 71 per cent higher than the unfertilized control yield, and the weighted average profit on the use of the best fertilizers, at farmers' prices, being 470 per cent of the cost of the fertilizer. These figures compare with, in West Africa, an overall average response to the best fertilizer treatment with all crops of 46 per cent higher than the unfertilized control, and an average profit from the best treatments of 260 per cent; and in the Near East and North Africa, 56 per cent higher than the control yield and 200 per cent profit over the cost of fertilizer. The simple trials gave still better results.

Reasons for the higher response in Latin America are that the average rainfall is higher and better distributed, and the standard of farming higher there than in large areas of the other regions. Consequently heavier fertilizer applications could often be used. Also, vegetable crops, which proved to give extremely high profits on fertilizer use, were widely included. In addition, profits on other food crops were good because prices obtained by the farmers were higher than in some of the countries in the other regions. Crops tested in the region included maize (the principal food crop), wheat, rice, potatoes (which gave returns of about ten times the cost of the treatment), soya beans and cabbage. In West Africa, crops tested included maize, sorghum, millet, rice, yams and groundnuts. In the Near East and North Africa the crops were wheat, barley, maize, rice, potatoes and cotton. The programme was especially successful in Turkey, where government support has been excellent and the numbers of demonstrations and trials very large.

El Salvador's Minister of Agriculture initiates an FAO programme by spreading the first fertilizer on a demonstration plot. Progress has been good in Latin America

At first the fertilizer programme was aimed mainly at carrying out large numbers of fertilizer demonstrations and simple trials on farmers' fields. These were supplemented by economic studies on fertilizer marketing and development and, at a later stage, by pilot schemes on fertilizer distribution and credit. These schemes have proved so important that they are likely to become a major feature in any continuation of the fertilizer programme.

To begin with, the pilot schemes emphasized the importance of fertilizer distribution and marketing in countries where facilities for this were inadequate. Then it was found that, even if there was a good fertilizer distribution network, small farmers might be discouraged from buying fertilizers by lack of cash and difficulties in getting credit. The scope of the pilot schemes was therefore enlarged to provide fertilizer credit where necessary, and sometimes this became their principal purpose.

One of the chief principles of the

pilot schemes is that of the "revolving fund," which is guaranteed by the government and which ensures that the money received from the sale of fertilizers in one year shall be used to purchase more fertilizers in the next. The original fertilizer being a gift, and assuming that the gift is repeated, the scheme doubles its size in the second year and trebles it in the third.

When the small peasant farmers are first introduced to fertilizers the commercial price may seem rather high to them, even though it still allows a good profit to be made on the crop produced. Frequently, therefore, an element of subsidy is introduced by the government, which provides the fertilizer at one-half or two-thirds of the commercial price. Generally the intention is to reduce, and finally to discontinue, the subsidy as farmers become familiar with fertilizers and appreciate their value. At first fertilizers were bought by the FAO out of the budget of the fertilizer programme but recently direct gifts have been made by the fertilizer industry or by a donor country, or the fertilizer may be bought by the home governments for the pilot schemes.

Twice a year the FAO Fertilizer Industry Advisory Panel, representing the contributors from the industry, has met in Rome to receive a report from the FAO on the progress made and to advise on further developments. Recently a number of observers from governments of fertilizer-exporting or other aid-giving countries have been invited to attend the panel meetings, and some of the donor countries have offered to supply men or fertilizers, or both, to be used under FAO supervision.

The fertilizer industry now gives a considerable tonnage of fertilizers in kind, in addition to the money contributions it makes. The total value of all contributions received during the first five years of the work, including those from donor and recipient countries, has considerably exceeded £1 million.

Because the work in the field is carried out by the agricultural officers of the countries concerned, and since various additional services are given by the participating countries, the programme provides a considerable multiplication of the money and manpower contributed by the industry, the donor governments and the FAO. Up to the end of 1964 the total value of contributions to the field work from the industry and donor countries through the FAO was about £230,000, while the value of the contributions from the recipient countries was over £580,000. During 1965 there were 18 FAO technical officers working under the programme in the field, and the number of local staff working whole-time or part time was 1,770. Thus there was a multiplying factor of over 2 : 1 in value of contributions, and nearly 100 : 1 in numbers of personnel taking part. This of course helps to explain why such striking results have been obtained from a relatively modest programme.

Major features of the programme since the beginning have been training courses for local agricultural staff, and farmers' field days held at the sites of successful demonstrations and trials. As a result, agricultural officers in developing countries are now far more familiar with fertilizers than they were, and both they and the farmers are convinced of the effectiveness of fertilizers. The emphasis on making direct personal contact with farmers has had a tonic effect on the extension services in many of the countries where the programme operates, and this is recognised by the governments.

There are many more developing countries which would like to participate in the programme and still more countries which would undoubtedly benefit from it. The programme has been remarkably effective in view of its relatively limited resources. A great deal more can be done in the future, but this will require increased support from all concerned: from the fertilizer industry, the donor countries, the recipient countries, and the FAO itself. In view of the population problems that loom over the world, no effort to extend this work could be too large.

A shipment of sulphate of ammonia from Agricultural Division's Billingham factory is loaded on board the SS "Elysia" at Middlesbrough docks en route for India

DRY CLEANING— A £50,000,000 INDUSTRY

Norman Crowder

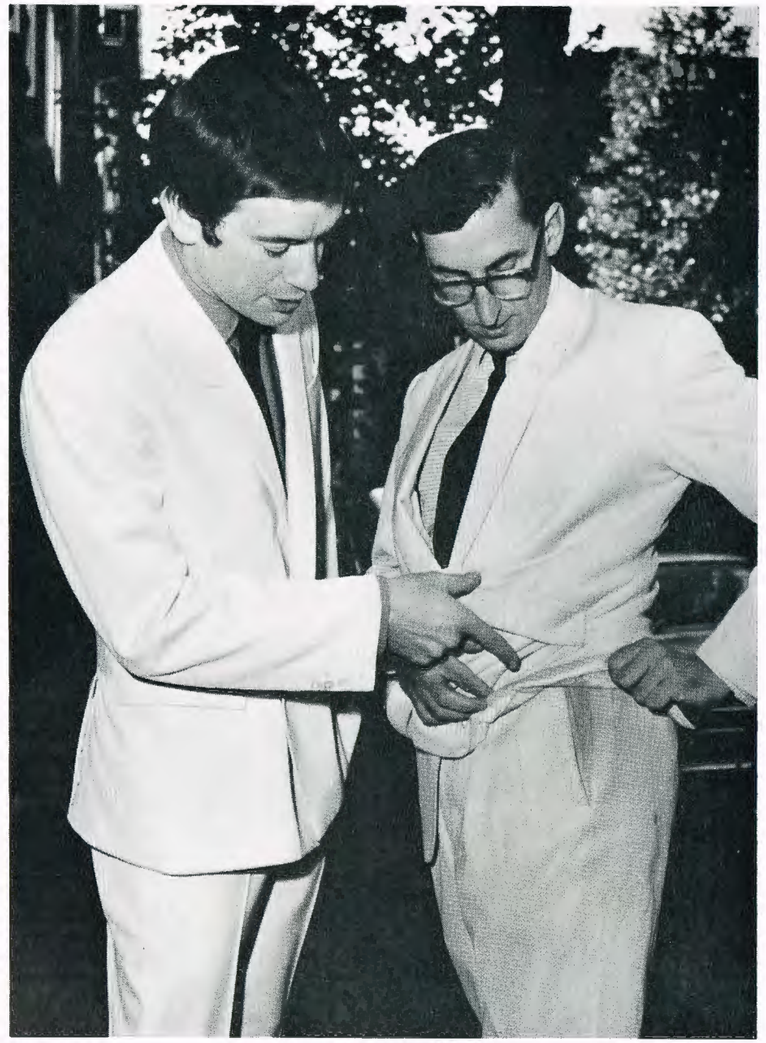
Over the years dry cleaning has developed from small hit-or-miss beginnings to a nationwide industry with an annual turnover of £50 millions. It has come a long way since the early days of 100 years ago, when the slow and costly cleaning service involved unpicking the seams of garments, treating each piece separately, and sewing the whole thing together again before pressing. With great distances often separating the collection shops and the cleaning factories, the whole process could take a fortnight or more.

Compare this with the convenience, speed and efficiency of the industry today, with its unit shops, each a self-contained miniature factory which can provide a one-hour service; and the many specialist services dry-cleaners now offer, such as proofing and re-texturing, dyeing, the cleaning of leathers and suedes, tailoring repairs, carpet cleaning and others. One of the latest developments is the coin-operated do-it-yourself establishment, usually linked with a launderette.

Dry cleaning began more than 100 years ago when Jean Baptiste Jolly, a Frenchman who owned a dyeworks, accidentally knocked over a paraffin lamp on to his soiled linen tablecloth. When it dried, the greasy spots had all been removed from the parts on which the oil had spilled, showing up the dirtiness of the remainder.

Until this time, clothes which could not be cleaned by submerging in water for washing by normal methods were cleaned by careful scrubbing with a hard brush, soap and water, a process known as scouring. Even this was harsh on many fabrics and, because water swells most fibres, the fabrics shrank and the clothes lost their shape. After M. Jolly's discovery, paraffin replaced water for such cleaning, and the process was called "dry cleaning."

Experiments soon showed that paraffin was not ideal for the new process and led to the use of benzine. Other French "dyers and scourers" soon offered similar processes, and dry cleaning was introduced from France to Scotland in 1866. Four years later it was



The "men in the white suits"–Stuart McMillan (left) and Roger Smith, who as part of a campaign to encourage wider use of dry cleaning wore white suits for a month in London to demonstrate the effects on clothes of city grit and grime. Here they examine the pockets of Smith's suit at the end of the test. To illustrate the results more clearly, McMillan's suit has just been dry-cleaned after a month of wear

The perchloroethylene plant at Castner-Kellner Works, Runcorn, where Mond Division's 'Perklone' solvent is made for use by dry-cleaners throughout the country

brought to London by a young Frenchman and his wife who were seeking refuge from the Prussian invasion of France.

The early methods were gradually improved and simple machines replaced much of the tedious hand work. Garments could be treated whole, instead of being taken to pieces. Further experiments with solvents led to the general use of "white spirit" as the most efficient and generally satisfactory dry-cleaning fluid in everyday use. Because it was inflammable, it could only be used in works specially designed for the purpose, away from shops and private houses.

During the first world war, Government demand for cleaning Service uniforms encouraged the development of faster cleaning services. Design of machines for both cleaning and finishing advanced rapidly, so that by the end of the war the dry-cleaning process was more widely known and used than ever before.

In those days fewer special finishes were applied to give fabrics such characteristics as stiffness, gloss or crease-resistance. Fabrics were usually made from the natural fibres —wool, cotton, linen or silk—and regenerated cellulose fibres such as the viscose rayons. After the second world war, however, the dry-cleaning industry found it had to cope with the new synthetic fibres. The need for expert information on such developments led to the formation in 1946 of the Dyers' and Cleaners' Research Organisation. From its laboratories at Harrogate, where every aspect of dry cleaning is investigated, information and advice go to dry-cleaning firms and to the textile industry throughout Great Britain.

In recent years, major advances in the design of dry-cleaning machines and the production of non-inflammable chlorinated cleaning solvents have made possible a fully-automatic enclosed machine for cleaning garments and furnishings. Research has also made it possible to remove most water-borne stains during the cleaning process, as well as grease. This has cut costs and reduced the time for the whole process. Because the chlorinated solvents now in general use are non-inflammable, they can be used in machines installed in town-centre shop premises—the "unit shops"—so that the customer gets a quicker and more convenient service. Dry cleaning can even be done in self-service coin-operated machines.

Research and development have kept the cost of dry cleaning to the customer relatively low. The average price for dry-cleaning a three-piece suit today is 8s., compared with 6s. 6d. in 1926 and 5s. 6d. in 1946, and the quality of the cleaning is higher than ever before.

What do you get for your money? Your suit, coat or skirt goes first to the "spotter," who treats various stains by hand—a specialised and essential job. Then the garment is put into a tumbler machine where the solvent gently dissolves the grease. The dirt floats away, the cleaning solvent is recovered in the machine and the garment emerges clean and fresh.

The main non-inflammable chlorinated solvent used in dry cleaning is perchloroethylene, sold by Mond Division under the registered trade mark 'Perklone.' A high-quality solvent, it is chemically stable and so has no harmful effects on materials normally used in the construction of dry-cleaning plants. It is an excellent grease solvent and is also readily volatile, so that cleaned garments can be easily dried. Since it can be distilled at a relatively low temperature, a supply of fresh solvent is always available for rinsing.

'Perklone' has almost completely replaced 'Triklone,' Mond Division's trichloroethylene, which was used extensively in Britain as a dry-cleaning solvent from about 1930 until the 1950s but which is now used only for cleaning industrial overalls.

The most recent and most gentle addition to the Mond range of solvents is 'Arklone,' one of the series of compounds of carbon, chlorine and fluorine which are already well known as refrigerants and aerosol propellants. It has exceptionally low toxicity and, like 'Perklone,' is non-inflammable.

The main attraction of 'Arklone' for dry-cleaners is for cleaning garments or materials which present difficulty or may even be uncleanable with ordinary solvents. Among these are sheepskin coats, suedes and furs, and imitation furs.

Its high volatility, which makes rapid drying possible at low temperatures, its inertness to textile dyes, finishes, buttons, ornaments and sensitive trimming materials such as leather and fur, and its very low toxicity, all make 'Arklone' an ideal solvent for the self-service coin-operated dry-cleaning machines.

A recent Mond Division innovation which is saving time and trouble for the dry-cleaner is the small bulk-storage tank holding 250 gallons of solvent, provided on free loan for the unit shop as part of the Division's solvent service. Mond's sales representatives see that the tank is sited satisfactorily and safely, so that road delivery tankers can gain easy access. Most of the country is covered by delivery from Castner-Kellner Works at Runcorn, where 'Perklone' is made, and from ICI depots and agents.

The alternative to use of the tank is delivery in 45-gallon drums which when full weigh about 7 cwt. and are difficult to handle. With the bulk tank, the solvent can be fed directly into the cleaning machine. Where there is no pipe link, the storage tank still scores over the 7 cwt. drum, because the dry-cleaner can run off the solvent from the tank into small covered containers and top up the cleaning machine whenever necessary.

A variation of the bulk storage system is the solvent "milk round" delivery recently introduced in the London area. Solvent is delivered from the tanker through a meter, just like petrol at a garage. The tanker driver simply asks how much is needed and the required amount is then pumped through into the customer's bulk tank.

'Perklone,' 'Arklone' and 'Triklone' must be used safely and efficiently by the dry-cleaners, and to ensure this Mond Division provides technical service from Division headquarters at Runcorn or through specialist dry-cleaning representatives at regional sales offices. These experts visit each new customer before any solvent is supplied, inspect his premises and advise him on siting machines and supply tanks, correct ventilation and the handling of the solvent, so that he fully understands its properties before starting to use it.

Advice and help are also given to manufacturers of dry-cleaning machines. The Division also provides a laboratory service to help the dry-cleaner. For example, if a garment is damaged in a particular process, the laboratory will look into the cause and advise the dry-cleaner.

Looking to the future, much effort is being devoted to applied research and developing new products and processes.

Mond Division became even more closely linked with the industry last September with the launching of a national campaign aimed at making members of the public more aware of the benefits of dry cleaning. The industry believes that most people would send their clothes to be cleaned much earlier if they realised how regular cleaning protects their garments from the abrasive action of dirt particles.

Almost 500 of the country's dry-cleaners, representing over 70 per cent of the industry in the UK, and many of their suppliers, are subscribing to the campaign. As one of the main sponsors, Mond supply the movement with a chairman for its advisory council (Mr. E. M. Tarling, Publicity Manager of the Division), whose "man in the white suit" television advertisements have made such an impression on the public.

The Division's contribution to the campaign is £20,000 a year for three years, and the dry-cleaning firms themselves are contributing a half of one per cent of their annual turnover for the same period. Advertising on television and in the Press is continuing, together with direct mail and display material for the shops. At the same time, market research is being done to find out what customers want and to measure public acceptance of the dry-cleaning drive. Results are difficult to measure with accuracy so early in the campaign, but there appears already to have been some change in public attitudes. Significantly more people now believe that dry cleaning lengthens the life of their clothes and that regular dry cleaning saves money in the long run. The industry's turnover is rising too—nine per cent higher in the first quarter of 1966 compared with the same period in 1965.

Garments like this fur coat, which are difficult or impossible to clean with ordinary solvents, can now be dry-cleaned with the use of Mond Division's 'Arklone'

The introduction of chlorinated solvents for use in totally enclosed machines, which made possible quicker, on-the-spot service, was the biggest development of the last 40 years. Since the early 1930s, new processes and new solvents have been introduced to cope with modern materials and fibres, and ICI has been the industry's main supplier of solvents, offering advice, practical help and technical service according to the need.

PEOPLE · PROJECTS · PRODUCTS

Mr. Harold Smith, the ICI Director responsible for ICI's business with the Soviet Union, visited Moscow during the British Industrial Exhibition there for discussions with the Minister of the Soviet Chemical Industry. He is seen at the exhibition (second from right) with Mr. Kosygin (extreme left) and Mr. Wilson (third from left). Also seen are Mr. O. Burstin and Mr. R. Tarrab of M. Golodetz, ICI's representatives in Moscow (fourth and fifth from left) and Mr. Jack Peel (extreme right) of ICI's East European Department

The British training ship "Sir Winston Churchill" leaving Falmouth early last month at the start of the Tall Ships race to Denmark, in which she finished first in her class. Cost of building the 300-ton top-sail schooner, which belongs to the Sail Training Association, was covered by public subscriptions and donations from industry, including ICI. Her sails are made entirely of 'Terylene'. (Photograph: Eileen Ramsay)

Lord Snowdon made an informal evening visit to the Pontypool Works of ICI Fibres in June in his capacity as adviser to the Council of Industrial Design. The visit was to see examples of design not only in our fabrics and end products but also in machinery and large-scale plant layout. Lord Snowdon is seen here chatting to Mr. W. Found

Construction has begun on the first 92 miles of Mond Division's trans-Pennine pipeline from Tees-side to Runcorn, Cheshire, and Thornton, Lancashire. The contract for the stretch from Wilton to Preston, valued at over £1 million, has been awarded to Taylor Woodrow Construction Ltd., and the job is due to be completed in 1967. A helicopter is being used to place lengths of pipe in position over the less accessible parts of the route, as here at Grassington Moor. The pipeline will carry ethylene from Wilton to Castner-Kellner and Hillhouse Works

The Queen's Award to Pharmaceuticals Division was presented to Mr. Sam Howard (right), Division Chairman, by Viscount Leverhulme, Lord Lieutenant of the County of Chester, at a luncheon at Alderley Park on 21st July attended by representatives from all Division departments. Pharmaceuticals Division, together with Dyestuffs Division and ICI Fibres, received the award for export achievements. Dyestuffs Division also qualified on the grounds of technological invention (in reactive dyestuffs), as did Agricultural Division (in gas production)

The Chairman of ICIANZ, ICI's Australian subsidiary, Sir Archibald Glenn, received a knighthood in the Birthday Honours. He is seen with Lady Glenn and their daughter, Miss Diana Glenn, at Buckingham Palace. Other ICI people in the Honours List were Mr. N. G. Wilson, Managing Director of Fibremakers Ltd., an ICIANZ subsidiary (CMG); Dr. F. T. Hamblin, General Manager of ICI (Deutschland) GmbH (CBE); Mr. J. F. Hook, ICI (Export) representative in Indonesia (OBE); Mr. J. Wilson, an assistant technical officer with Mond Division (MBE); and Mr. J. McArthur, a supervisor at Plastics Division's Dumfries Factory (BEM)

JOHN REX WHINFIELD

Mr. G. F. Whitby, ICI Director, writes:
It was with deep regret that we learned of the death of J. R. Whinfield on 6th July at the age of 65. He was educated at Merchant Taylors' School and Caius College, Cambridge, and after working for a short time with C. F. Cross, who with E. J. Bevan had discovered viscose rayon in 1892, joined the Calico Printers' Association in 1923.

Whinfield had always been interested in synthetic fibres and followed closely the work of W. H. Carothers of Du Pont, who invented nylon and the melt spinning process, and to whom he always paid the highest tribute. As the result of imaginative deduction and careful experiment, in which he was assisted by J. T. Dickson, he invented in 1941 the polyester polymer which we know as 'Terylene' fibre and 'Melinex' film. Development was delayed due to the second world war, but in 1947 ICI acquired the world rights, apart from the USA, where Du Pont bought the rights and developed 'Dacron' fibre. In the same year Whinfield joined ICI.

Whinfield's invention was among the most important of our time, and we in ICI are proud to have worked with him. Now extensive plants of our own at home and abroad, and of licensees in many countries, are supplying vast quantities of polyester fibre to all important centres of textile industry, bringing benefits to people all over the world. Honours awarded to Whinfield included a CBE in 1954, honorary Fellowship of the Textile Institute in 1955, and the Perkin Medal of the Society of Dyers and Colourists in 1956. In 1965 the University of York gave his name to a new library and to a number of travelling scholarships.

Rex Whinfield was a quiet and modest man, yet one who was at ease in any company. He had travelled widely, including a tour in Russia at the request of the Government of the USSR, and wherever he and his wife Nora went they made firm friends.

It is a happy memory to recall the ease with which he talked to and encouraged young research workers, and when lecturing was able to hold the interest equally of the learned and of the young. After retiring he and his wife lived at Dorking, where he continued some research work and writing. We shall remember him for his invention, for his devotion to science and industry, and for his friendship.

RETIREMENT

Dr. J. M. Holm

Dr. John Sisson, ICI Director, writes:
After his strenuous years as Chairman of Nobel Division, Dr. John Holm has decided to retire a little early so that he can enjoy his sailing and gardening. A member of the Division Board since 1952, he became Chairman in 1961 and by the end of last June had completed 32½ years' service.

He joined the Research Department of Nobel Division after graduating at Glasgow University, and except for the war years, when he was seconded to the Ministry of Supply as Deputy Director of Explosives, he spent all his working life in the Division.

Had he not chosen a career in industry, he would have achieved eminence in the academic world. At heart he has a strong academic attachment, which he has shown by his interest in the new University of Strathclyde. He is a member of the University Court and Convener of the Staff Appointments Committee. He intends now he is retired to continue to devote much time to the University, to which he has already contributed so much. He is also a member of the Highlands and Islands Development Consultative Council.

His main recreation is sailing, and two years ago he had built at Fairlie, near his home, a fine 10-ton auxiliary sloop *Westering Home*. Much of his time will be spent cruising on the beautiful waters of the Firth of Clyde, which his house in Largs overlooks.

John Holm has the outstanding quality of kindly humanity. He looked upon Nobel Division as his family and worked for the well-being of everyone in the Division. His kindliness and wisdom will be missed by his friends and colleagues not only in the Division but in ICI as a whole. We all wish John Holm and his wife a long, healthy and happy future.

THE ADVANCE ON EUROPE

Of all the changes which have taken place within ICI in recent years, few have been wider in scope than those which have been made and are still being made in the Company's sales and manufacturing organisation in Western Europe. From the setting up of a 300-acre multi-plant factory at Rozenburg to the formation of new selling companies from Portugal to Finland, these changes are all part of the attacking strategy for Continental markets. They were described by **Mr E. J. Callard,** *the ICI Director who is Chairman of ICI (Europa) Ltd., in a talk to the third Central Staff Conference in London (which perhaps appropriately was held at the Europa Hotel), and his remarks are reproduced here for the benefit of our Magazine readers.*

WE must first define our terms. So far as ICI is concerned the territory of Western Europe is, in effect, the whole of continental Europe west of the Iron Curtain with the exception of Greece and Turkey. This covers 15 countries, most of which belong to one or another of the economic groupings known as the European Free Trade Association (EFTA) or the European Economic Community (EEC).

In 1965 sales of ICI products within the territory were £76 million, of which 13% or £9·7 million were manufactured on the Continent. Our export contribution to these sales was £55 million.

As plants built or building come into full production, the proportion of our sales deriving from local manufacture will increase rapidly, but we expect our exports to grow too. The present population of these 15 countries is 250–260 million people, compared with the UK's population of 55 million. Our current sales figure per head of population in the UK is a little under £8 per annum; our sales per head of population in Western Europe approximate to 6s. per annum. Against the entrenched competition (and regardless of what the tariff position may eventually be) we are not likely to increase our sales in Europe to equal this figure of £8 per head. But the comparison at least indicates the great scope for expansion. Our sales in Western Europe approximately doubled between 1960 and 1965, and our present plan is to double them again in the next five years.

If we can achieve this, our turnover should reach £150 million in 1970, not very different from the total sales of ICI to external customers in the UK in the year 1953, calculated at 1965 prices. This comparison may not be entirely valid or accurate but it may help to fix in our minds the size of what we plan to do.

The total capital invested by ICI in Europe amounted to almost £50 million at the end of 1965, of which £13 million was added in that year. We expect to spend a similar sum in 1966, and perhaps £10-million per annum thereafter. This represents 4½% of our present total investment and 16% of ICI's investment overseas.

Until the late 'fifties Continental Europe was regarded almost as an export area and we had a relatively small interest in manufacturing there. With the changes occurring both in the economic and political relationships of continental countries, it became clear that if we were greatly to increase our business in these countries it would be necessary to manufacture in them, particularly in those of the EEC, where tariff barriers might persist against us. The policy was to build up a series of wholly or partially-owned activities making products near the consumer, which in turn required as their raw materials chemical intermediates, and by these means to build up a captive demand for the chemical products we make. This demand would in time provide a base load for chemical plants of economic size, which we might later construct on the Continent. Accordingly ICI bought into, bought up, or created a number of manufacturing companies in Europe.

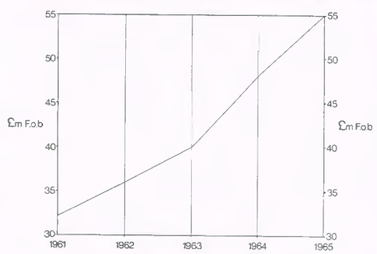
Sales Companies

Also, up to that time our sales in Europe had largely been built up by the individual efforts of Divisions selling through ICI (Export) Ltd. and its branches in Europe or through numerous local agents. Since 1960 our selling organisation has been rationalised. We have progressively disengaged from agency selling and have formed wholly-owned selling companies in almost every territory. These companies operate under the ICI name, for example ICI (Deutschland), Svenska ICI, ICI (España), etc. In addition, it was decided to obtain and develop a large site on which we could locate plants to make either finished products or intermediates and which over the years would develop into a large central chemical complex. Such a site was obtained at Rozenburg, near Rotterdam.

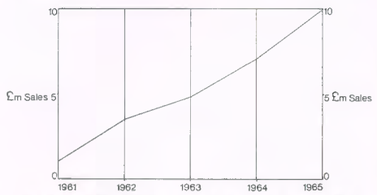
As a result of these activities we now have in Western Europe 57 companies, wholly owned, subsidiary or associated, in which the ICI shareholding ranges from 15% upwards and of which 20 are mainly concerned with selling. The range of products manufactured is very wide: it includes chlorine and caustic soda for the papermaking industry in Finland, plasticisors and paint in France, 'Terylene' staple for the textile industry of Portugal, polythene, dyestuffs, pigments and arctons in Spain, polythene also in Denmark, paint in Ireland and Germany, leathercloth in Holland, and pvc in six countries.

300-acre Site

Our biggest manufacturing ventures are, however, in nylon spinning at Oestringen in West Germany and in the complex of plants at Rozenburg which we wholly own. This site, conveniently situated beside Europort, the largest port in Europe and aptly called the Gateway to Europe, is over 300 acres in area and is being provided with direct access from the sea for large ships to our own dock, which has been named Britanniahaven. The construction of this dock involves dredging out many millions of tons of silt over several years before it is complete, but it is already available to small vessels. On this site we already have working, plants to make 'Diakon,' 'Perspex' and nylon polymer. A plant to make 'Melinex' is now starting up. The first polythene unit



EXPORTS TO WESTERN EUROPE



CONTINENTAL MANUFACTURE

to make 45,000 tons a year is under test and will start up as soon as the special ships are available to transport to Rozenburg ethylene produced from our crackers at Wilton. A second and similar polythene unit is under construction, and projects are in hand for 'Terylene' polymer and 'Alloprene.' All these plants are intended to use intermediates exported from the UK, thus retaining the benefits of larger-scale manufacture from basic plants in this country.

All this illustrates the complexity in product range, in financial structure, and in geography, of our activities in Western Europe. There are many other facets of them which create problems against which to match our wits. Though sales from direct exports have been increasing, the proportion of our sales which are of Continental manufacture is increasing rapidly, so that we are changing from being mainly sellers of goods in Europe to being large-scale manufacturers too. The problems arising from the increase in size of the manufacturing operation, from increasing sales and from the need to plan the overall development of our business on the Continent in logical ways led the Company to strengthen the organisation for handling it.

New Structure

In 1965 a new company was set up called ICI (Europa) Ltd., which superseded the European Council and is in effect a co-ordinating and supervising organisation. When fully developed it will plan the development of ICI's overall interests in Western Europe, administer the ICI selling companies, and supervise ICI manufacturing enterprises on the Continent.

Initially, and for many years ahead, responsibility will necessarily be divided between the UK Divisions and ICI (Europa) Ltd., but an attempt has been made to define as clearly as possible for each activity where responsibility rests mainly on a Division or on ICI (Europa). The new company is supervised, subject to general policy guidance from the ICI Board, by a board of directors consisting of myself as ICI Director responsible for Western Europe as Chairman; two other ICI Directors; the Chairmen of those Divisions with present or projected large manufacturing interests; and two senior managers from Head Office functional departments as well as the Chief Executive Officer of the new company. Headquarters will be in Brussels, and most of the senior staff will be living there from the end of 1966 or early 1967. A sub-headquarters in London will be used by staff mainly concerned with countries in the European Free Trade Association.

For operating purposes that part of the Company dealing with the EEC countries has been organised in groups corresponding roughly in product scope to that of Divisions in the UK. Initially there will be three groups, for fibres, plastics and chemicals. Their General Managers will be responsible for both production and marketing within their groups, and for selling through the national selling companies within the broad directives of marketing policy and prices laid down by the home divisions. Functional departments will deal with techno-commercial planning, with engineering, personnel, accountancy and so on, and all the selling companies will respond directly to ICI (Europa). The company will remain dependent on the basic technical resources of the home Divisions, and success will depend to a very large degree on complete co-operation between it and the Divisions in this country, and not just on the way the organisational chart has been drawn.

At present we have in Western Europe about 60 British staff in a total of all ICI employees of 4,560. The number may rise to 90 by the end of this year owing to the move of headquarters staff to Brussels. Among the 60 at present resident on the Continent about 35 are on temporary secondment for periods of about six months to two years and 25 are more permanent. They come from all parts of ICI. Some are technical, some are commercial staff, and most are specialists in some particular field. It will remain the practice for the Divisions and ICI (Europa) to co-operate closely in the choosing of people for temporary secondment. I have not included in these numbers staff who are in Europe for six months or less, of which there are always a considerable number. The number of British staff is not expected to increase in proportion to the total. Those offered positions on the Continent, whether secondments are temporary or permanent, are likely to be specialists, and the present policy of employing West European nationals wherever we can without disadvantage is likely to continue. The proportion and number of British staff are likely to remain small, as they are now.

Brussels, at the centre of which is the Maison du Roi (above) in the Grand'Place, is the city chosen for the headquarters of ICI (Europa) Ltd. The first staff, of the Plastics and Chemicals Groups, moved into their new offices in the Boulevard du Régent in July

MUSIC ON TEES-SIDE

Bergamo, Italy: Gruppo Folkloristico 'Arlecchino'. Right: Liverpool, England: Eaglais á Chnoć Scottish dancers

A town of tents sprang up last month in the grounds of ICI's recreation club at Wilton. Inside (and often outside too, impromptu), some 6,000 British and foreign competitors, sang, danced and played in Tees-side's International Industrial Eisteddfod. About 60,000 visitors came to watch the performers from 21 countries taking part in the first event of its kind in the world.

Dr. S. Jenkin Evans, senior medical officer at Wilton, has been the prime mover in this project. A large, voluble Welshman, he has spent the past two years inspiring others on Tees-side with his own enthusiasm and persuading industry, the trade unions, local authorities and other organisations on Tees-side to provide backing of over £30,000.

The idea of holding an eisteddfod on Tees-side occurred to him, he says, while in his bath listening to a concert broadcast from the Albert Hall. He was only too aware that rapid industrial development on Tees-side (£700 million since the war) had far outstripped any corresponding cultural development. One way of encouraging greater interest in the arts, he felt, would be to hold an eisteddfod, particularly as there are many people of Welsh origin on Tees-side today.

There is nothing extraordinary to a Welshman in the idea of an eisteddfod, Dr. Jenkin Evans points out. It is an ancient tradition dating back at least to the twelfth century and possibly far earlier, and many minor events are held each year in Wales besides the National and Llangollen International festivals. What is unique about the Tees-side Eisteddfod is in its emphasis on industry.

"Llangollen is an international gathering concerned exclusively with folk dancing and singing. We all admire what they have achieved, but we aimed at something rather different. The emphasis in our planning was on people who live and work in industrial communities—hence the title 'Industrial.' We canvassed our activities and sought entries not only from industry at home but also, through personal contacts, the Central Office of Information, the British Council and the embassies, from industrial organisations in Europe and the USA. We concentrated on chemicals, engineering and steel, the main industries on Tees-side.

"We broadened the scope of our programme to include brass-band contests, with special classes for industrial brass bands,

PHOTOGRAPHS: OTTO KARMINSKI

Sofia, Bulgaria: Plana Folk Song Ensemble

Lignières-en-Berry, France: Les Thiaulins

MUSIC ON TEES-SIDE

Utah, USA: Brigham Young University folk dancers

violin and piano-playing competitions, painting and craft exhibitions, and competitive events in cine-camera work. We also arranged concerts each evening with professional singers and musicians. We tried to cater for many tastes: programmes ranged from Beethoven's *Missa Solemnis* with the Huddersfield Choral Society and a recital by Elisabeth Schwarzkopf to folk singers like Shirley Abicair and Julie Felix and dancing by the Hungarian State Gipsy Company."

Few music festivals pay their way purely on ticket money. Tees-side received generous grants from the North Riding County Council, the local authorities on Tees-side and the North Eastern Association for the Arts. It was also lucky in having many of the trophies and other prizes donated by local firms, including ICI.

The organisers of the Eisteddfod were "pleasantly amazed," says Dr. Jenkin Evans, at the number of entries from overseas. Some travelled enormous distances to take part, among them the Mormon student folk-dancing team from Utah, USA, and the Plana Folk Singers from Sofia, Bulgaria.

A number of late entries had regretfully to be refused. As it was, the Eisteddfod hospitality committee successfully arranged free accommodation with local families for the 2,600 entries accepted. Finding beds for these overseas visitors for the duration of the Eisteddfod was just one of the many jobs undertaken by the various organising committees. Altogether some 350 people helped on these committees, including ICI employees from Billingham and Wilton, and many wives and Company pensioners. Others helped to organise local events during Eisteddfod week, while many more entertained competitors in their own homes.

Tea party for guests from Bordeaux at the home of Robert Tulip (Nylon Works)

Sir Paul Chambers, ICI Chairman, seen here with visitors from Sweden and Dr. S. Jenkin Evans, was one of the "day presidents" and presented trophies and prizes

A camera looks at
'OCEAN PRINCE'

Right: At the end of a twelve-hour night shift, driller Ray Baber of Louisiana relaxes after breakfast in the messroom on the "Ocean Prince." Below: Hard physical work and keen concentration are called for in many jobs – as when "roughnecks" change the drill

For almost six months of this year a team of more than 80 men worked aboard the 11,000-ton drilling rig *Ocean Prince* on the first well to be drilled for the Burmah North Sea Group, the consortium formed by ICI, the Burmah Oil Company and two American companies to take part in the North Sea exploration for oil and natural gas.

Twenty-eight miles off Flamborough Head they often shivered and more rarely sweltered in conditions which varied from snow, ice and winter gales to an early summer heat wave. Apart from periods in February, when severe storms stopped all work, they toiled in twelve-hour round the clock shifts to maintain drilling progress. By the time final tests early last month showed, disappointingly, that neither gas nor oil was present in commercial quantities they had sunk the well to a depth of more than nine thousand feet.

Some of them, the drilling specialists, were Americans with years of oil-rig experience in the Gulf of Mexico and elsewhere. The remainder were British, recruited mainly from Tees-side or the villages along the North Yorkshire coast. As members of the drilling teams some qualified, in the special language of oil-men, for such descriptions as toolpushers, derrickmen, drillers, roughnecks, roustabouts and mud-loggers. Others, in support, were simply electricians or radio operators, geologists or cooks. Whatever their jobs and titles, they worked in separate crews which alternately spent 14 days on board and seven days ashore, and when the weather permitted they travelled to and from the rig by helicopter. This was based at Scarborough, and with it on one of its recent trips went photographer Michael Taylor, who took these pictures of the rig and of some of the men at work and at rest.

After twelve hours of work, particularly the combination of sheer physical effort and mental concentration which so many jobs on a drilling rig seem to demand, the crew of the *Ocean Prince* often want to do nothing more than have a meal in the brightly decorated mess hall before sleeping off the rest of their free time in one of the bunk rooms. For those who want to use it, however, there is a recreation room complete with a radio, dartboard and television set. The rig also has a laundry, changing rooms, showers and a sick-bay, as well as quarters for visitors.

'OCEAN PRINCE'

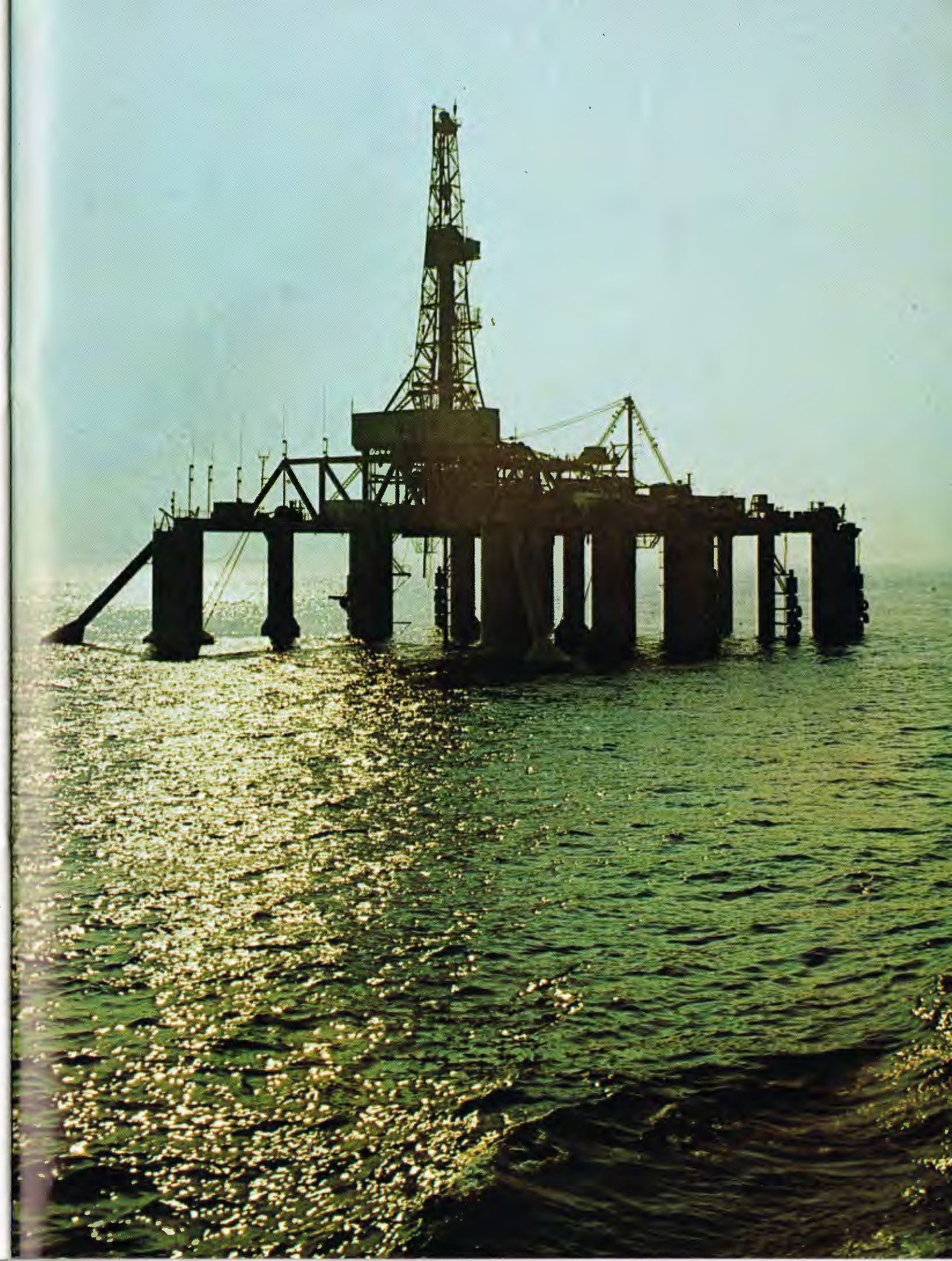
When Taylor visited the rig there were reasonable hopes that gas would soon be found in commercially worthwhile quantities. The geology seemed right and other indications were good. Two weeks later prospects were less bright, and within a short time came the official news that the well had been completed "without finding a commercial accumulation of gas or oil."

A disappointment for everyone, the result was received philosophically by the experienced oil-men in the crew, on the *Ocean Prince* or elsewhere. Over years of exploring for oil they have become used to the odds against any well producing a worthwhile "strike" being as high as 10 to 1.

This element of chance makes any exploration for oil or gas very expensive – and in the North Sea costs are sent soaring by the uncertain weather, the need for special drilling rigs costing upwards of £2m. each, and by difficult supply problems. The cost of drilling an exploratory well may be £500,000 or more. The stakes needed to take part in what has been described as one of the greatest gambles of the century are very high, although of course the latest scientific methods are used at every stage to increase the odds in a successful find.

But the possible returns are also high, and that is why the *Ocean Prince* is already working at another spot in the North Sea for a group which has leased the rig to drill one exploratory well, and why when that well is completed the rig will return to the Burmah North Sea Group.

Above: Geologist John Stott of Arizona, a graduate of the University of California, examines drill core samples under the microscope. Right: In the communications room, Garth Stotter, a ballast control room officer from Scarborough, calls up his home by radiotelephone. Far right: The North Sea weather was not always like this for men aboard the rig, and in February gales brought all work to a halt.



Filming for ICI

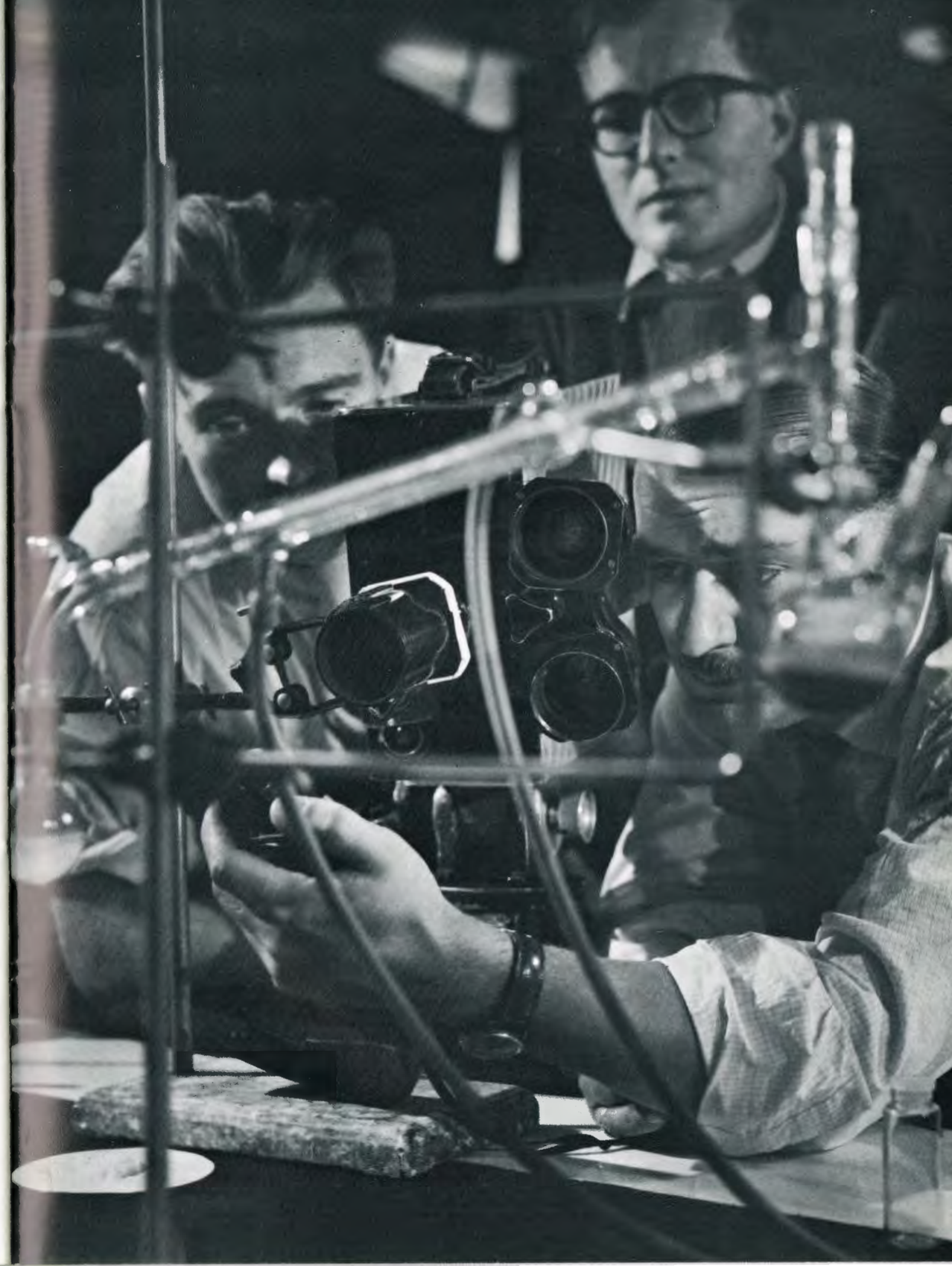
Gordon Begg

Frames from the film of the first Central Council, 1928.

Since the early years of the century enthusiasts in the companies that became ICI have used cine film. For many years the fact that the pictures moved was enough: early efforts do no more than record events as they happened. One such record is the film of the first Central Council, held at IC House in 1928. This film is important not only because it preserves for posterity the councillors of forty years ago in their tweed caps and bowlers, but also because it was almost certainly the first Company-initiated film and gave birth to an idea which was realised years later in the ICI Film Unit. For behind the camera that rode in the open charabanc with the men from Winnington and Witton and Ardeer was a young man called Galvin Wright. Ahead of his time, he realised the potential of films as a means of communicating with a large mass of people. Before he retired last year as ICI Publicity Controller he was to see the Film Unit, which he created and which is now a subsidiary company, Millbank Films Ltd., winning top awards, and its films reaching millions of people in dozens of countries.

The Film Unit's start was modest. It was in wartime England of the early 1940s that the first two technicians were recruited, the first cameras bought and, despite a desperate shortage of film stock, the first films put into production. From the beginning the emphasis was on films to do a job. An instructional film for the government on the PIAT gun, then being developed at Witton, and a schools film on catalysis in the manufacture of sulphuric acid (still being distributed) were among the first pioneering films. By 1947, when I joined the Unit, it had some eight technicians and was embarking on a series of internal relations films.

Today British industry sponsors at least a thousand films a year, and their applications are many and varied. Perhaps the most obvious general use is for advertising, both on TV and in the cinema. Millbank Films make about eight films a year. They have on occasion made "commercials," but this type of film is normally handled by Divisions' advertising agents and is not therefore included in the figure given. To what other uses are films put in the service of industry? At present we have some fifteen films at one stage of production or another. One explains a new shot-firing technique to miners, another, for farmers, shows dairy hygiene systems for preventing mastitis. A film sponsored by British Visqueen Ltd. is



"Small Scale Organic Preparations," 1963: director (P. S. de W. Rawson), cameraman (P. J. Grimwood), and assistant cameraman (W. F. Prowse) shoot a close-up of a chemical reaction

"Chromatography," 1962: R. H. Reed, Dyestuffs Division, took part in this film for schools, of which 150 copies are in circulation

Contact '66: this sequence from the new "magazine" film shows a model taking part in the Bri-Nylon dress show presented at the recent opening of the new ICI Europa works at Oestringen, Germany, as she makes up beforehand

intended to persuade municipal authorities that the polythene bag is the best method of collecting refuse, while another is a one-minute TV trailer urging parents to keep polythene bags away from young children, as they can so easily be lethal. Exposition of the technique known as discounted cash flow to industrial managers, of the life and times of John Dalton to sixth-formers, of Agricultural Division's steam reforming process to potential licensees—these are some of the applications of film that are at present keeping us busy. Films to keep ICI informed about itself are also on the schedule. *Contact '66*, a new colour 'magazine' film covering the Company's activities at home and abroad, will be given its first showing at Central Council in November and will then go to Divisions, associated and subsidiary companies and ICI overseas.

People are always trying to categorise the uses of film in industry—informing, instructing, sales promotion, etc. The task is scarcely possible, as any film festival organiser will testify, and certainly unrewarding, usually ending up with this sort of sentence: "Films on management and man-power training (for example management methods, measures for increasing productivity, rationalisation, automation, human relations within the firm, vocational guidance and training) intended rather for an industrial audience than for the general public."

I see it thus. In industry great numbers of people have something to communicate to someone else, managers to supervisors, salesmen to customers, safety officers to quarrymen, directors to the general public. The permutations are almost endless, and film is one way to help them communicate. It is not the only one. For some jobs it may not be the best medium, but in many cases only moving pictures can put the message across so graphically and so powerfully and, if accurately aimed, at so many different levels. If this thesis is accepted, the question of costs must be examined. Films are not cheap to make or to distribute, so the value of a particular film to the sponsor must be carefully considered. A common fault with sponsors is to exclaim at the figure quoted for a film, instead of relating the amount to the estimated number of relevant viewers over a valid period of time.

Talk of the producer brings me to write about the people who make films. First a word about man-power usage. There is a tendency to think that one or maybe two men can mount a major industrial film. However, to "shoot" any interior subject correctly where the camera has to move and there is also movement of people within the frame we need a crew of five. A director to direct the action (i.e. the people appearing on the screen). A lighting cameraman and an electrician to light the subject and to keep watch on the lighting during shooting. A first assistant to operate the camera (i.e. panning, tilting) and a second one to adjust the focus as the camera moves. Take one of these men away, and the risk of failure, involving loss of time, money and film stock, becomes very high. Secondly, in film production there are several things going on at the same time. Your one-or two-man band is forced to do every stage itself and as a result makes about 1½ films a year—not a very productive operation.

Let us consider now the producer's role as opposed to the director's. The producer is the man responsible for a film being made at the price and in the time quoted. He must also be involved in the creative side. If he sees the material shot by a unit the day before and thinks it is below standard in any way he must tell the director so. But since he may have several directors working under his supervision at once he cannot be expected to know every nuance of every scene scripted. This is the job of the director, who, ideally, is only concerned with one film at a time, and in most Millbank films works on it from start to finish. If one man can be said to be mainly responsible for a film's success or non-success it is the director, or writer/director, as he normally is with us.

He has a number of people helping him, the main ones being cameramen, electricians and an editor. There may be also actors, commentators, composers of music and sound crews to record their efforts; designers of titles and/or animated diagrams or cartoons, art directors to design sets and carpenters, joiners and painters to build them; costumiers, make-up experts and hairdressers; assistant directors, production managers, buyers, props hirers, etc. There are even chaperones for children under 12,

"Black Monday," 1962: a film on safety in the laboratory which took first prize at Berlin. This picture showing the aftermath of an explosion was shot in Plastics Division's Research Laboratories

and dog handlers—for the rare occasions when Rover gets in on the act!

It is seldom that one of our productions calls for such numbers, but however many people make up the unit it is the director, helped by the producer, who must get the best out of the many and varied talents.

Planning a film

Let us assume Paints Division wants to make a film about a new finish. It is aimed at existing customers who may buy the new product, and entirely new potential customers too. After preliminary briefing discussions with the Division and the producer, the director makes his survey, which may take some weeks. He really gets to know the product and how it is made. He sees it tested and he follows sample batches to specially picked customers to see its applications. The director now sits and thinks. What type of people make up his audience? How technically trained are they, if at all? Is a hard sell required? Is there a need for direct synchronous recorded speech in which the dialogue is recorded during filming, with the camera and a tape recorder linked at the same speed? And if so, do we use actors or real people? Are foreign language versions required? Now the film is written. Probably the first stage is a "treatment"—a continuous readable narrative which tells the sponsor in lay terms what he will see on the screen and hear on the track. When this is approved, the writer/director turns it into a shooting script—the film's blueprint, so to speak, this time in film terms with numbered scenes marked on the left half of the page and words, music and sound effects indicated on the right.

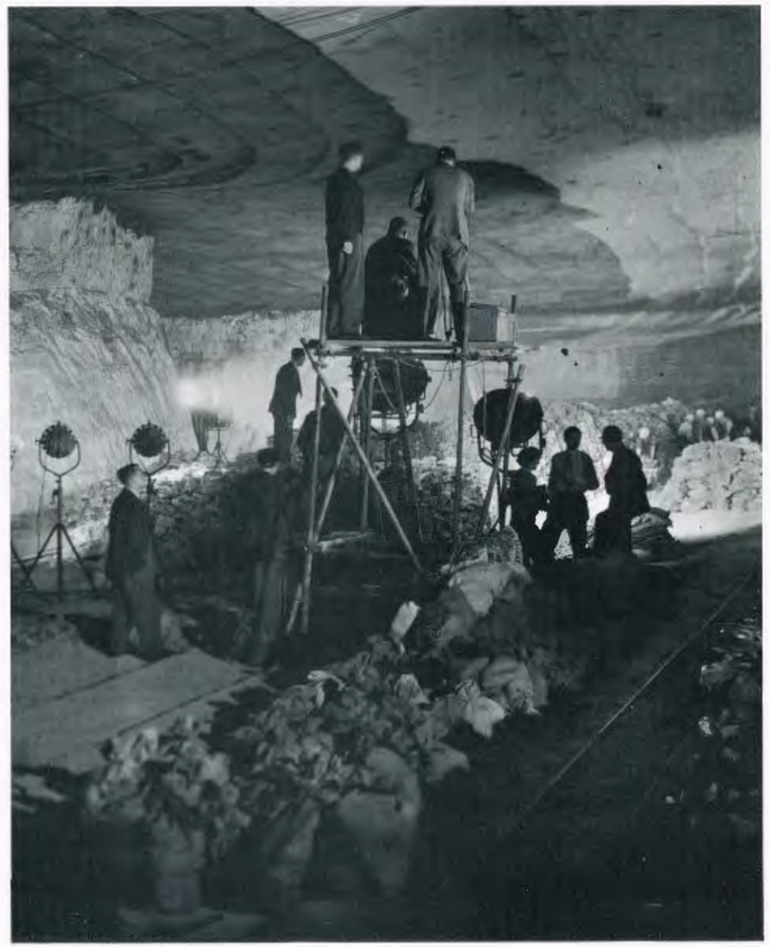
During this time plans for shooting will have been made, accommodation booked and transport organised. The cameraman will have visited the various locations and planned his lighting arrangements. The editor will have read the treatment and added his advice or forewarnings. The final estimate of costs will have been worked out and presented. It is accepted and they are off!

As the unit completes each day's shooting the exposed negative is sent by train or by air to the processing laboratories, who develop it overnight and send a "rush" print to the producer the following day. Thus control is maintained and any scene which suffers because of technical faults, or any of the dozens of other things that may go wrong, can be reshot before the unit leaves the relevant location.

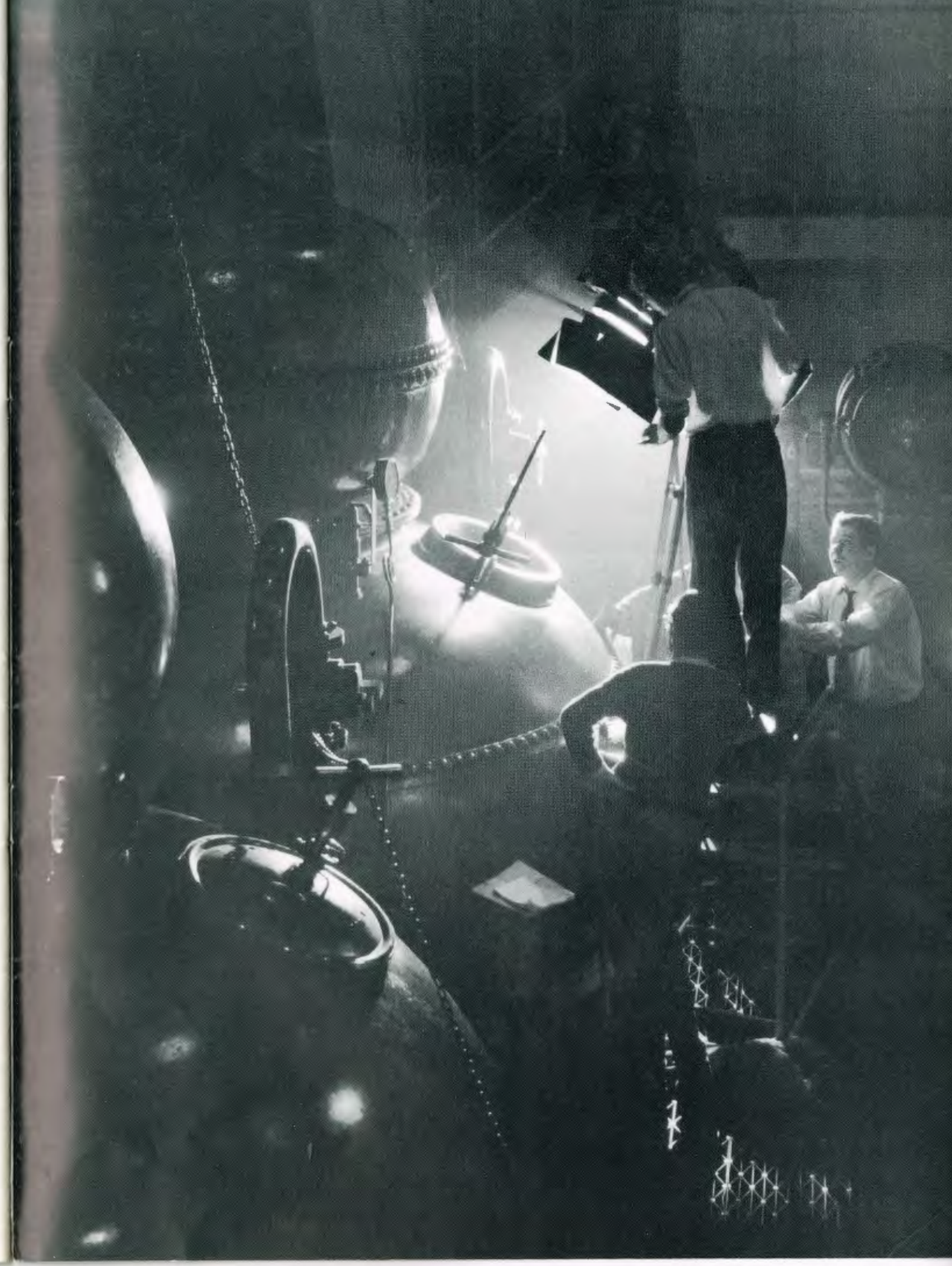
In the cutting room the editor breaks down the rush prints and reassembles them into the cutting copy, scene by scene, as scripted. By the time the unit returns from the Division and the customer's works, a set has been built in the studio for a sequence in a shop and the visual side of the film is complete except for this sequence, titles and opticals (i.e. the "mixes," in which one scene appears to dissolve into another, and the "fades," where one scene may fade into blackness and the next starts with blackness and gradually becomes light).

When all is shot there is generally an approval show for the sponsor with commentary read live. If this is approved, then the commentary, music and sound effects are separately recorded then fitted perfectly to the picture on the sound track. A dubbing session to combine these sound tracks with the direct synchronous dialogue in the studio sequence is held, and that is all as far as Millbank Films is concerned. Now the laboratories take over from the film-makers. Picture negative is cut and joined and matched to the combined sound track negative. Into the printer they go, and we get the first full print.

But long before this we have moved on. The director is in Italy filming vineyards, the cameraman is down a coalmine, the editor is trying to make sense of "Estimating Cash Profits by Computer"—and the producer worrying about the Dutch Customs, interviewing a Chinese commentator, trying to get hold of Dudley Moore. Don't worry, he's busy. . . .



"This is Salt," 1950: A huge area like the Meadow Bank salt mine at Winsford, Cheshire, now run by Mond Division, presents big lighting problems. This scene needed twenty 150-amp arc lamps and 1¼ tons of cable, several hundred feet below ground. All this equipment had to be taken down the mine and specially set up



"Distillation," 1959: These massive copper stills, which were photographed for this film at Gordon's Gin Distillery, Clerkenwell, are 160 years old

'Sintilon' corrugated polyvinyl chloride sheeting was introduced to the building industry in July 1964. Since then it has made rapid headway as a high-quality roof-lighting material. Made by extrusion at the Newton Works of ICI (Hyde) in Cheshire, the sheet is available in a wide variety of colours and in transparent, diffused and opaque forms. It lets through up to 85 per cent of light and has a high impact strength